

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : HONDA MOTOR CO LTD

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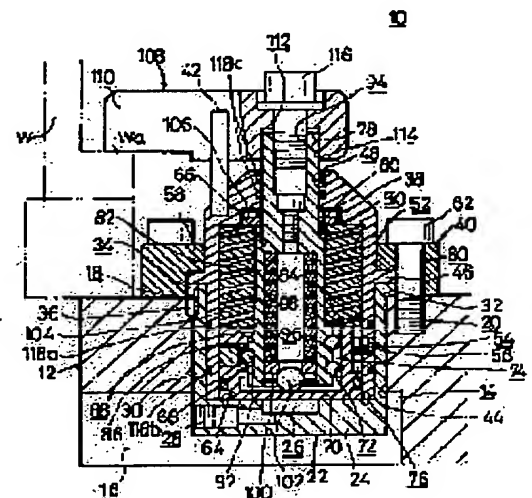
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NISHIZUKA KOJI

(54) CLAMP DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To quickly and easily carry out a preparation work corresponding to various works different in shape through simple construction.

SOLUTION: A clamp device is provided with a bottomed cylindrical cylinder member communicating with a compressed fluid supply source; a casing 38 having a cylindrical part 44 inserted into the cylinder member 22; a fixed member 40 which pressingly holds the movable side flange part 46 of the casing 38 against the fixed side flange part 32 of the cylinder member 22, and can be freely connected to a jig pallet 12; and a piston member 64 accommodated in the casing 38 and a rod member 66 which is provided in the piston member 64 and has a clamp arm member 108 attached at one end.



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CLAIMS

[Claim(s)]

[Claim 1] While having the fixed side flange by which positioning immobilization is carried out on the fixture pallet top face and having the body inserted free [rotation] into the closed-end barrel-cylinder member which is open for free passage to a compression fluid supply source, and said cylinder part material Casing which prepares the movable side flange which contacts on said fixed side flange, The ring-like holddown member which is prepared in said fixture pallet free [conclusion], presses the top face of said movable side flange to said fixed side flange side, and fixes said casing to this fixture pallet, The cylindrical piston member linearly displaced through the compression fluid and elastic body which are arranged free [sliding] and supplied from said cylinder part material in said body of said casing, The rod member which it is [the exterior of said casing] exposed of member at the end, prepares the clamp arm member for work-piece press, and is arranged in said piston member, Clamp equipment characterized by having a rotation means for it to be constituted between said piston members and said rod members, and to rotate this rod member to this piston member.

[Claim 2] It is clamp equipment which the end of said rod member is equipped with said clamp arm member free [a splash] in clamp equipment according to claim 1, is fixed to said fixture pallet, and is characterized by equipping the end by the side of work-piece press of this clamp arm member with the stanchion member which engages with the other end of an opposite hand.

[Claim 3] It is clamp equipment characterized by constituting a conclusion means for said stanchion member fixing said ring-like holddown member to said fixture pallet in clamp equipment according to claim 2.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the clamp equipment for carrying out press maintenance of said work piece to a work piece by the clamp arm member in which an attitude and turning are free.

[0002]

[Description of the Prior Art] Generally, a transfer machine carries out predetermined spacing alienation, arranges the processing equipment with which the versatility needed for processing of a work piece differs, the work-piece inverter made to change said work piece into a desired position corresponding to the processing part, and it is constituted so that said work piece may be conveyed one by one to each station through a concrete supply system and a request may be processed.

[0003] In this case, at each station, in order to perform predetermined processing to a work piece at accuracy, it is necessary to carry out positioning immobilization of the work piece conveyed with said concrete supply system firmly for example, on a fixture pallet. Then, in order to hold a work piece on a fixture pallet, various clamp equipments are used from the former.

[0004] This kind of clamp equipment is usually equipped with cylinder-like casing, and the piston is arranged in ** formed in this casing free [sliding]. The arm member for a clamp is engaging with the point of the piston rod which extends above from this piston, and press immobilization of the work piece is carried out on the fixture pallet through this arm member.

[0005] While the lead slot which directs and inclines in the direction of a periphery from an axis in the peripheral face of a piston rod is formed in that case, the slot is formed in the inner skin section of casing, and the sphere has fitted into this slot and said lead slot in one. And if a compression fluid is introduced into ** in casing, it goes up, while a piston rotates in the predetermined direction under the spherical advice operation which fits into a lead slot and a slot in one, and the arm member which is carrying out press maintenance of the work piece can shunt in the location which estranged only the predetermined include angle further from the upper part of this work piece.

[0006]

[Problem(s) to be Solved by the Invention] By the way, with above clamp equipment, the casing member is concluded with the direct bolt on the fixture pallet. For this reason, in case a clamp location is changed in connection with the configuration of a work piece being changed, there is a fault that it cannot respond easily. For this reason, many tapped holes are beforehand prepared on the fixture pallet, and after rotating a casing member in the predetermined direction with modification of a clamp location, the activity which concludes a bolt to a predetermined tapped hole is usually done.

[0007] In case the housekeeping substitute at the time of the configuration of a work piece being changed (preparatory work) is fairly complicated and is especially equipped with much clamp equipments by this, the problem that this preparatory work takes much time amount is pointed out.

[0008] This invention solves this kind of problem, is an easy configuration and aims at offering the easy clamp equipment which can be carried out for a short time for the preparatory work accompanying configuration modification of a work piece.

[0009]

[Means for Solving the Problem] In order to solve the aforementioned technical problem, this invention carries out positioning immobilization of the closed-end barrel-cylinder member which is open for free passage to a compression fluid supply source at a fixture pallet, and the rod member which prepared the clamp arm member, the cylindrical piston member in which this rod member is arranged, and casing in which this piston member is arranged are inserted in said cylinder part material free [rotation] in one. And the movable side flange prepared in casing is laid on the fixed side flange of cylinder part material, and said casing is fixed to a fixture pallet by carrying out press support of the top face of said movable side flange by the ring-like holddown member.

[0010] Subsequently, if only a predetermined include angle rotates casing after loosening a ring-like holddown member and canceling the press operation to a movable side flange, in case the clamp location by the clamp arm member is changed with configuration modification of a work piece etc., a clamp arm member will rotate through a piston member and a rod member in one with this casing. Then, a clamp arm member concludes a ring-like holddown member on a fixture pallet in the condition of having been arranged at the predetermined angular position.

[0011] Thereby, after loosening a ring-like holddown member, it can respond easily for modification of the configuration of a work piece, and promptly by very easy actuation of rotating casing.

[0012] Moreover, the end of a rod member is equipped with the clamp arm member free [a splash], and a stanchion member engages with the edge of an opposite hand the work-piece press side of this clamp arm member. For this reason, a clamp arm member has both the so-called **** clamp function that uses a stanchion member as the supporting point and presses a work piece. If a stanchion member constitutes a conclusion means to fix a ring-like holddown member to a fixture pallet, in that case, the miniaturization of the whole equipment and the cutback of the number of components will be carried out easily.

[0013]

[Embodiment of the Invention] Drawing 1 is drawing of longitudinal section in the condition that the clamp equipment 10 concerning the 1st operation gestalt of this invention was built into the fixture pallet 12, and drawing 2 is the decomposition perspective view of said clamp equipment 10.

[0014] The fixture pallet 12 is in the condition which carried out positioning maintenance of the work piece W, and carries out sequential conveyance of said work piece W through the concrete supply system which is not illustrated at each station in transfer. The fixture pallet 12 forms the comparatively major diameter pore 14 in a predetermined part by predetermined Mr. Fukashi in the direction of a vertical, and the notching section 16 is open for free passage to the lower part side of this pore 14. While it is open for free passage at the periphery edge of a pore 14 part and the cross-section semicircle-like hole 18 is formed in the top face of the fixture pallet 12 to the predetermined depth, on a periphery [same axle / this pore 14], predetermined include-angle spacing alienation is carried out, and two or more tapped holes 20 are formed.

[0015] As shown in drawing 1 and drawing 2, clamp equipment 10 is equipped with the closed-end barrel-cylinder member 22 inserted in the pore 14 of the fixture pallet 12. A crevice 26 is formed in the inner surface central site of the pars basilaris ossis occipitalis 24 of the cylinder part material 22, and this crevice 26 is open for free passage to the path 28 formed toward the core from the periphery side of said pars basilaris ossis occipitalis 24. A path 28 can be freely opened for free passage to the compression fluid supply source which is not illustrated.

[0016] It projects in the direction of the outside of a radius, the fixed side flange 32 is formed in the upper bed section of the tubed part 30 which extends from a pars basilaris ossis occipitalis 24 to the upper part, and the hole 34 of the shape of a cross-section semicircle corresponding to the hole 18 of the fixture pallet 12 is formed in a part of this fixed side flange 32. A lock pin 36 is pressed fit in a hole 34 and the hole 18 of the fixture pallet 12 in one, and positioning immobilization of the cylinder part material 22 is carried out at said fixture pallet 12.

[0017] Casing 38 is fixed to the cylinder part material 22 through the ring-like holddown member 40. Casing 38 has the conic top-face section, and a stopper pin 42 is implanted in the periphery end edge. While casing 38 has the body 44 inserted free [rotation] into the tubed part 30 of the cylinder part material 22, the movable side flange 46 which projects in the direction of the outside of a radius, and contacts on the fixed side flange 32 of said cylinder part material 22 is formed in the upper part side of this body 44. A pore 48 is formed in the center of the top-face section of casing 38, and this pore 48 is open for free passage to a pore 50 and the comparatively major diameter pore 52 through a step. The tapped hole 54 which is open for free passage to a pore 52 is formed in the periphery end section of a body 44, and the set screw 56 is screwed in this

tapped hole 54.

[0018] The holddown member 40 has the shape of a ring, it projects in radius inboard and the ring-like press section 58 is formed in the upper part side. In parallel with the direction of an axis, two or more pores 60 for bolt insertion are formed in a holddown member 40 at a position. By inserting a bolt 62 in each pore 60, and screwing each point in the tapped hole 20 of the fixture pallet 12, the movable side flange 46 is pressed by the fixed side flange 32 in the press section 58 of a holddown member 40, and casing 38 is fixed to said fixture pallet 12.

[0019] While fitting of the sliding of the piston member 64 is made possible to the pore 52 of casing 38, the rod member 66 is arranged by this piston member 64 free [rotation] through the rotation means 68.

[0020] The piston member 64 has approximate circle tubed, and the plate section 70 is formed in the blockaded end. While the slot 72 which has the shape of a cross-section semicircle and is gone around spirally is formed in the inner skin section of the piston member 64, the roll off 74 for returns is formed in a part of this slot 72. The notching section 76 with predetermined die length is formed in the direction of an axis at the periphery section of the piston member 64, and the set screw 56 is inserted in this notching section 76.

[0021] The rod member 66 has the 1st rod section 78 which fits into the pore 48 of casing 38, and the major diameter 2nd rod section 82 is formed in the edge of this 1st rod section 78 through the 1st shoulder 80. While the much more major diameter 3rd rod section 86 is formed through the 2nd shoulder 84, the slot 88 which has the shape of a cross-section semicircle in this 3rd rod section 86, and is around gone spirally in it is formed in the edge of this 2nd rod section 82. The ends of a slot 88 are connected through the return slot 90, and an endless-like ball path is formed. Two or more balls 92 fit into this slot 88 and the slot 72 of the piston member 64 in one, and, thereby, the ball screw means as a rotation means 68 is constituted.

[0022] Only the depth predetermined in a tapped hole 94 is formed in the center section of the 1st rod section 78 of the rod member 66 in the direction of an axis, and a pore 96 is formed in the center section of the 3rd rod section 86 in it. while the tabular spring member 98 is infixed in a pore 96 and the ring 100 for a stop contacts the edge of this spring member 98 -- this ring 100 for a stop -- a sphere -- 102 is engaged. The diameter of sphere 102 is greatly chosen from the bore of the ring 100 for a stop, it is in the condition that the piston member 64 was equipped with the rod member 66, and a predetermined gap is formed for said edge of sphere 102 in contact with the plate section 70 between the end face of the 3rd rod section 86 of said rod member 66, and the inner surface of this plate section 70.

[0023] The tabular spring member 104 is infixed into the pore 52 of casing 38, and the piston member 64 and the rod member 66 are pressed outside said pore 52 through the resiliency of this spring member 104 to a way (vertical down). This spring member 104 has fairly bigger resiliency than the spring member 98.

[0024] The ring 106 formed in the boundary step of the 1st rod section 78 and the 2nd rod section 82 with the wear-resistant ingredient is arranged. The 1st rod section 78 fitted into the pore 48 of casing 38, and has exposed that point outside, and this point is equipped with the clamp arm member 108 for work-piece press. The clamp arm member 108 has the press section 110 which has trapezoidal shape in that end section side, and the pore 112 for bolt insertion and the pore [major diameter / pore / 112 / this] 114 for rod fitting are formed in the other end side corresponding to this press section 110.

[0025] When the 1st rod section 78 of the rod member 66 fits into the pore 114 of the clamp arm member 108 and a bolt 116 screws in the tapped hole 94 of said rod member 66 from the pore 112 of said clamp arm member 108, this clamp arm member 108 is fixed to said rod member 66.

[0026] the body 44 of casing 38, and the tubed part 30 of the cylinder part material 22 -- liquid -- while the seal members 118a and 118b for carrying out a seal densely are arranged, seal member 118c for preventing that dust etc. advances into a pore 52 from the gap of the 1st rod section 78 of the rod member 66 and said casing 38 is arranged in the pore 48 of said casing 38.

[0027] Thus, actuation of the clamp equipment 10 constituted is explained below.

[0028] As shown in drawing 1 and drawing 3, where press maintenance of the heights W_a of a work piece W is carried out through the clamp arm member 108 which is engaging with the rod member 66, the fixture pallet 12 is moved and predetermined processing is performed to this work piece W . Next, in order to exchange the work piece [finishing / processing] W for the new work piece W , the fixture pallet 12 is moved to a predetermined compression fluid supply location.

[0029] Then, if the duct for compressed-air supply (not shown) is connected to the path 28 of the cylinder part material 22 and a compression fluid is supplied to this path 28 as shown in drawing 1, after this compression fluid is supplied to a crevice 26, the piston member 64 will be pressed to vertical above. for this reason, the set which is screwing the piston member 64 in the tapped hole 54 of casing 38 -- bis-- 56 and this set -- bis-- the resiliency of the spring member 104 is resisted under an advice operation with the notching section 76 in which 56 is inserted, it displaces linearly to vertical above, and the rod member 66 currently arranged in this piston member 64 goes up similarly. Therefore, the clamp arm member 108 which is engaging with the upper bed section of the rod member 66 estranges the press section 110 from the heights Wa of a work piece W, and cancels a maintenance operation of said work piece W.

[0030] If the piston member 64 goes up further as shown in drawing 4, the ring 106 currently arranged in the boundary part of the 1st rod section 78 of the rod member 66 and the 2nd rod section 82 will contact the step between the pores 48 and 50 of casing 38. In this condition, if the piston member 64 is pressed by vertical above under an operation of a compression fluid, it will not rotate on the set screw 56 inserted in the notching section 76, and the rod member 66 will rotate this piston member 64 in the predetermined direction through the rotation means 68 which is a ball screw means.

[0031] In that case, the rod member 66 will be rotated until the end face of the 3rd rod section 86 contacts the plate section 70 of the piston member 64. Consequently, the clamp arm member 108 which is engaging with the point of the rod member 66 rotates and shunts the upper part of the heights Wa of a work piece W in the predetermined direction, and the press section 110 of this clamp arm member 108 estranges it effectively from said work piece W (refer to drawing 4).

[0032] Next, a work piece W is removed from the fixture pallet 12, the new work piece W is laid on this fixture pallet 12, and positioning immobilization is carried out with clamp equipment 10.

[0033] That is, if the compression fluid to a path 28 has supply suspended, the thrust which was acting on the piston member 64 vertical above will be canceled, and only the resiliency of the spring member 104 will act on this piston member 64. For this reason, the rod member 66 which the piston member 64 displaced to vertical down, and was pressed by the plate section 70 of this piston member 64 is rotated to hard flow with the above through the resiliency of the spring member 98, when said piston member 64 descends. And in case the 2nd shoulder 84 which is a boundary step of the 2nd rod section 82 and the 3rd rod section 86 is in agreement with the top-face section of the piston member 64, the revolution of the rod member 66 stops [the spring member 104] in contact with said 2nd shoulder 84.

[0034] Furthermore, just before the rod member 66 and the piston member 64 descend in one and the plate section 70 of this piston member 64 contacts the inner surface of the pars basilaris ossis occipitalis 24 of the cylinder part material 22, it engages with the heights Wa of the work piece W with the new clamp arm member 108. Thereby, positioning maintenance of the new work piece W is firmly carried out to the fixture pallet 12 top in the bottom for the cartridge fits of the spring member 104 which acts on the piston member 64 and the rod member 66 through the clamp arm member 108.

[0035] By the way, in case the location of the heights Wa which are the clamp locations of this new work piece W by changing the configuration of the new work piece W is changed, with clamp equipment 10, positioning of the clamp arm member 108 is performed as a preparatory work.

[0036] Namely, the bolt 62 which is fixing the holddown member 40 to the fixture pallet 12 can loosen first, and where the press operation to the movable side flange 46 by the press section 58 of this holddown member 40 is canceled, casing 38 rotates in the predetermined direction in one with the piston member 64 and the rod member 66. And a bolt 62 is bound tight after the clamp arm member 108 is positioned corresponding to the new work piece W. Therefore, the press section 58 of a holddown member 40 carries out press maintenance of the movable side flange 46 of casing 38 to the fixed side flange 32 of the cylinder part material 22, and said casing 38 is fixed to the fixture pallet 12.

[0037] Thus, what is necessary is just to perform actuation which binds said bolt 62 tight with the 1st operation gestalt, after loosening a bolt 62 and rotating casing 38, in case positioning adjustment of the clamp arm member 108 is performed. For this reason, for example, two or more boltholes are prepared in the fixture pallet 12, and after taking out the bolt which is fixing casing 38 the very thing to the fixture pallet 12 and positioning this casing 38, compared with that [bolting / again / that / a bolt], the effectiveness that the housekeeping substitute (preparatory

work) corresponding to the new work piece W is simplified and quickened at once is acquired.

[0038] In case much clamp equipments 10 are especially used to the single work piece W, the preparatory work of said all clamp equipments 10 can be carried out efficiently in a short time. There is an advantage that the increase in efficiency of the whole line which includes processing to this work piece W by this is carried out easily.

[0039] And the miniaturization of clamp equipment 10 is attained and it can be arranged effective in the location of a request of said clamp equipment 10 while a configuration is simplified. Therefore, it is effective in excelling in versatility extremely.

[0040] Next, the clamp equipment 120 concerning the 2nd operation gestalt of this invention is explained. In addition, the same reference mark is given to the same component as the clamp equipment 10 concerning the 1st operation gestalt, and the detailed explanation is omitted.

[0041] As shown in drawing 5 and drawing 6, clamp equipment 120 is equipped with the clamp arm member 124 with which the 1st rod section 78 of the rod member 66 is equipped free [a splash] through the supporting-point pin 122. When the end 126 and this end 126 by the side of work-piece press have extended and formed the other end 128 of an opposite hand in the longitudinal direction among drawing and this clamp arm member 124 establishes a slot 130 in the pars basilaris ossis occipitalis by the side of said other end 128, the stopper side 132 is formed.

[0042] The flat spring 134 for an arm presser foot is held in the upper part of the 1st rod section 78. This flat spring 134 is always energized in contact with the other end 128 side of the clamp arm member 124 in the direction in which that end 126 side inclines this clamp arm member 124 up. On the other hand, the stopper 136 is formed in the opposite hand of flat spring 134.

[0043] It is located in a way outside a holddown member 40, two or more tapped holes 138 are formed in the fixture pallet 12 along with the circular face on a pore 14 and this alignment, and the thread part 142 prepared in the tapped hole 138 of 1 at the edge of the stanchion member 140 screws in it. The stanchion member 140 has extended in vertical above in parallel with the rod member 66, and the stop rod section 144 which advances into the slot 130 of the clamp arm member 124 is formed in the upper bed side.

[0044] Thus, with the clamp equipment 120 constituted, if a compression fluid is supplied to the cylinder part material 22 in order to cancel the clamp arm member 124 of the clamp condition shown in drawing 5, the piston member 64 and the rod member 66 in this cylinder part material 22 will go up in one.

[0045] In that case, the end 126 to which this clamp arm member 124 is pressing the work piece W under for the cartridge fits of the flat spring 134 which engages with the clamp arm member 124 is made to tilt up to the location stopped with a stopper 136, and it secedes from said work piece W immediately. Subsequently, when the rod member 66 rotates in the predetermined direction, the clamp arm member 124 rotates in the predetermined direction from the upper part of a work piece W.

[0046] On the other hand, by suspending supply of the compression fluid to the cylinder part material 22, in case a work piece W is clamped, while the rod member 66 carries out turning actuation like the 1st operation gestalt, it descends. For this reason, the clamp arm member 124 with which the 1st rod section 78 of the rod member 66 is equipped descends, after resulting above a work piece W, uses this stop rod section 144 as the supporting point, and makes an end 126 to be in the condition that the other end 128 was stopped by the stop rod section 144, and contact a work piece W. Therefore, it is in the condition which the clamp arm member 124 contacted the work piece W in the end 126, and was supported by the stanchion member 140 in the other end 128, and since the abbreviation center section is ****(ed) downward by the rod member 66, the effectiveness that press maintenance of said work piece W can be carried out still more firmly is acquired.

[0047] Then, in clamp equipment 120, in case it positions corresponding to the work piece W with which configurations differ, after making the thread part 142 of the stanchion member 140 secede from a tapped hole 138, a bolt 62 is loosened like the 1st operation gestalt, and the thrust to the movable side flange 46 of the casing 38 by the holddown member 40 is canceled. Subsequently, casing 38 is rotated in the predetermined direction and the clamp arm member 124 is positioned. Furthermore, while concluding a holddown member 40 through a bolt 62, the thread part 142 of the stanchion member 140 is screwed in the predetermined tapped hole 138. The same effectiveness as the 1st operation gestalt is acquired -- the preparatory work of the clamp equipment 120 corresponding to the new work piece W is simplified effectively by this.

[0048] Next, the clamp equipment 150 concerning the 3rd operation gestalt of this invention is explained below. In addition, the same reference mark is given to the same component as the 1st and 2nd operation gestalten, and the detailed explanation is omitted.

[0049] As shown in drawing 7 and drawing 8, clamp equipment 150 is equipped with the stanchion member 152 which also has a function as a binding means to fix a holddown member 40 to the fixture pallet 12 while it supports the other end 128 of the clamp arm member 124. This stanchion member 152 has in one the rod section 154 inserted in the pore 60 of a holddown member 40, and the thread part 156 screwed in the tapped hole 20 of the fixture pallet 12.

[0050] Therefore, with the clamp equipment 150 concerning the 3rd operation gestalt, the overall length of the clamp arm member 124 can be short-length-ized substantially. And the stanchion member 152 substitutes the bolt 62 of 1, and has the conclusion function of a holddown member 40, and the effectiveness that simplification of the configuration of the clamp equipment 150 whole is carried out at once is acquired.

[0051]

[Effect of the Invention] As mentioned above, with the clamp equipment concerning this invention, after only a predetermined include angle's rotating casing which prepared this movable side flange after canceling a press operation of the movable side flange by the ring-like holddown member and performing positioning of a clamp arm member, corresponding to the various work pieces with which configurations differ, the positioning activity of said clamp arm member is carried out promptly and easily only by performing conclusion of said ring-like holddown member. the time of much clamp equipments being especially formed in the fixture pallet -- the preparatory-work whole of said clamp equipment -- one effort -- a short time -- and it becomes possible to carry out efficiently.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing of longitudinal section in the condition of having equipped the fixture pallet with the clamp equipment concerning the 1st operation gestalt of this invention.

[Drawing 2] It is the decomposition perspective view of the clamp equipment concerning said 1st operation gestalt.

[Drawing 3] It is the flat-surface explanatory view of said clamp equipment shown in drawing 1 .

[Drawing 4] It is drawing of longitudinal section of the unclamping condition of the clamp equipment concerning said 1st operation gestalt.

[Drawing 5] It is a side-face explanatory view in the condition of having equipped the pallet with the clamp equipment concerning the 2nd operation gestalt of this invention.

[Drawing 6] It is the flat-surface explanatory view of the clamp equipment shown in drawing 5 .

[Drawing 7] It is a side-face explanatory view in the condition of having equipped the pallet with the clamp equipment concerning the 3rd operation gestalt of this invention.

[Drawing 8] It is the flat-surface explanatory view of the clamp equipment shown in drawing 7 .

[Description of Notations]

10,120,150 -- Clamp equipment 12 -- Fixture pallet
22 -- Cylinder part material 24 -- Pars basilaris ossis occipitalis
28 -- Path 32 -- Fixed side flange
38 -- Casing 40 -- Holddown member
44 -- Body 46 -- Movable side flange
58 -- Press section 64 -- Piston member
66 -- Rod member 68 -- Rotation means
108 124 -- Clamp arm member 122 -- Supporting-point pin
134 -- Flat spring for an arm presser foot 140 152 -- Stanchion member

[Translation done.]

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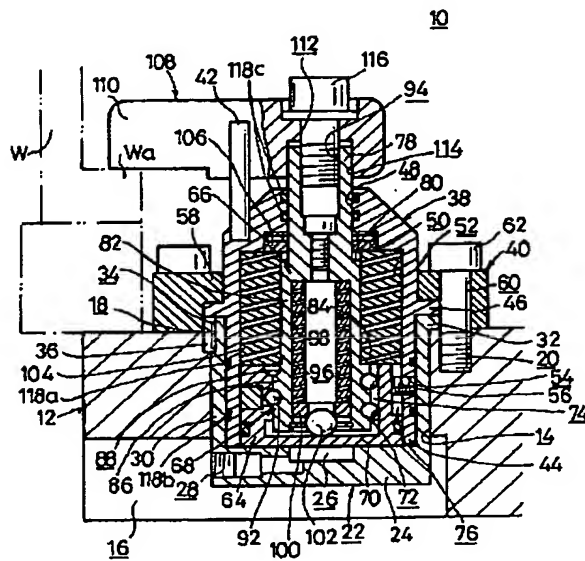
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DRAWINGS

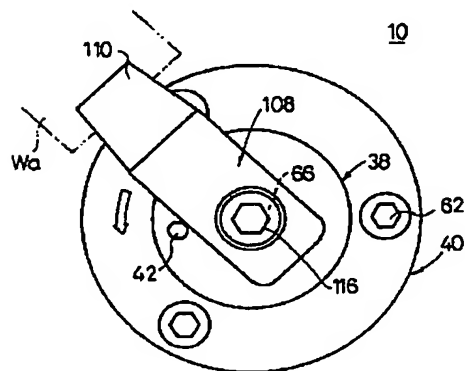
[Drawing 1]

FIG. 1

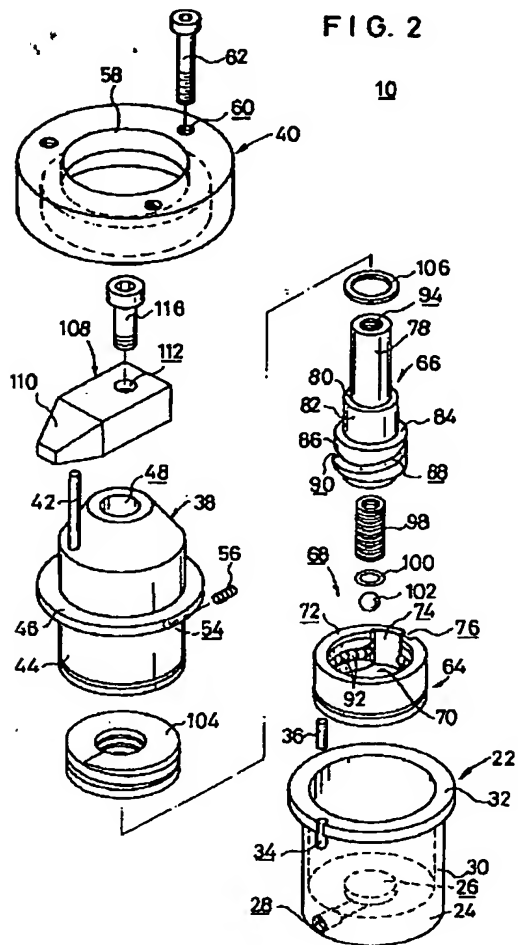


[Drawing 3]

FIG. 3

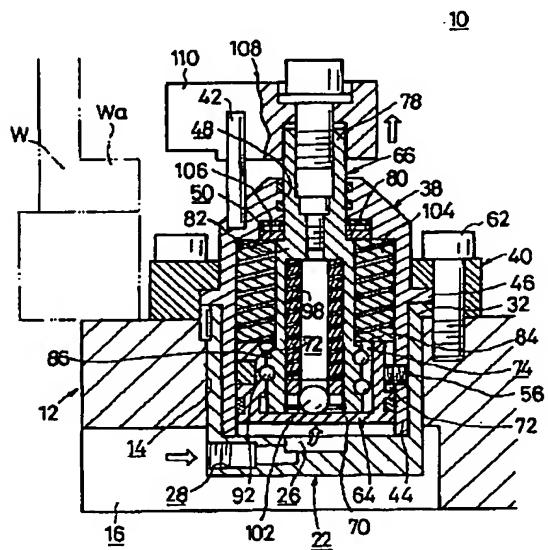


[Drawing 2]

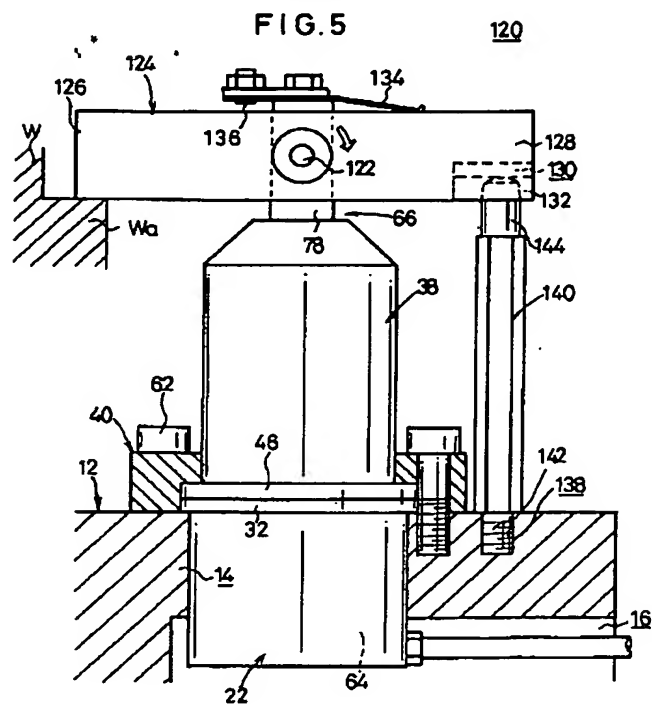


[Drawing 4]

FIG. 4

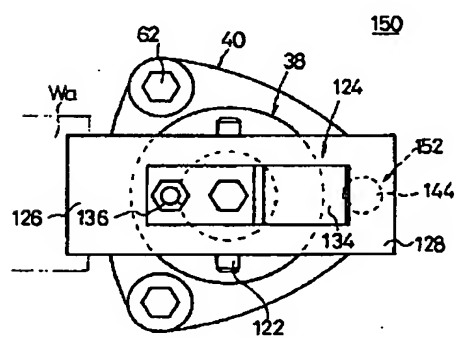


[Drawing 5]



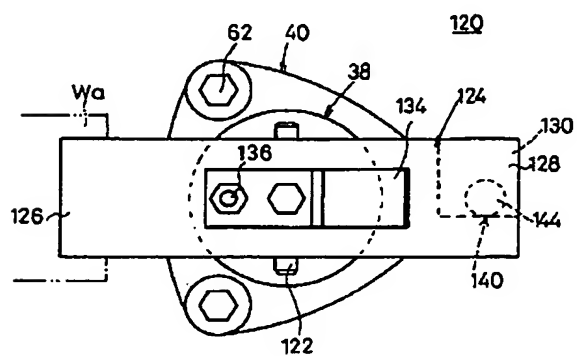
[Drawing 8]

FIG. 8



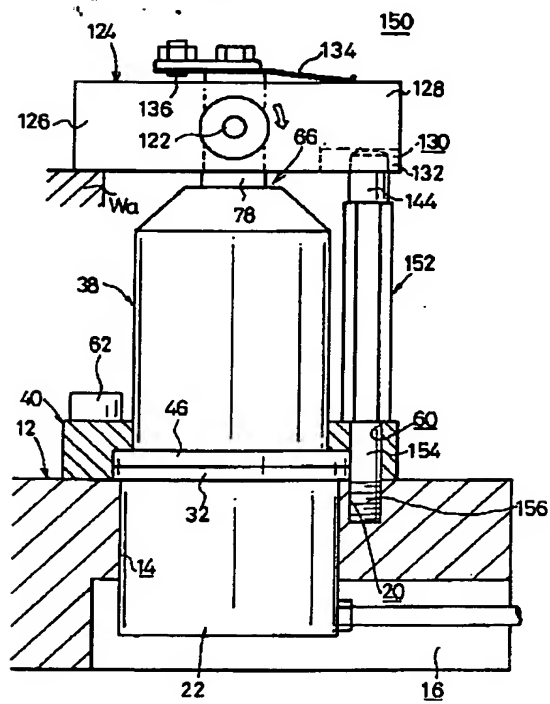
[Drawing 6]

FIG. 6



[Drawing 7]

FIG. 7



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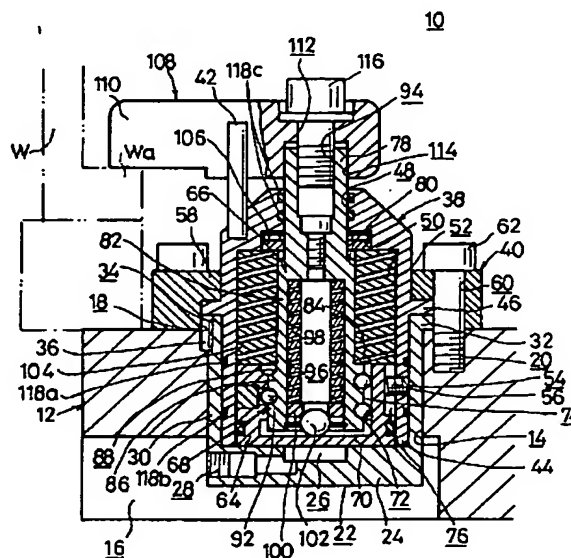
(54) 【発明の名称】 クランプ装置

(57) 【要約】

【課題】簡単な構成で、種々の形状の異なるワークに対応する準備作業を迅速かつ容易に遂行することを可能にする。

【解決手段】圧縮流体供給源に連通する有底円筒状シリ
ンダ部材２２と、このシリンダ部材２２内に挿入される
円筒部４４を有したケーシング３８と、前記ケーシング
３８の可動側フランジ部４６を前記シリンダ部材２２の
固定側フランジ部３２に押圧保持するとともに、治具バ
レット１２に締結自在な固定部材４０と、このケーシ
ング３８内に収容されるピストン部材６４およびこのピ
ストン部材６４内に配設され、一端にクランプアーム部材
１０８が装着されたロッド部材６６とを備える。

FIG. 1



【特許請求の範囲】

【請求項1】 治具バレット上面に位置決め固定される固定側フランジ部を有し、圧縮流体供給源に連通する有底円筒状シリンダ部材と、

前記シリンダ部材内に回動自在に挿入される円筒部を有するとともに、前記固定側フランジ部上に当接する可動側フランジ部を設けるケーシングと、

前記治具バレットに締結自在に設けられ、前記可動側フランジ部の上面を前記固定側フランジ部側に押圧して前記ケーシングを該治具バレットに対して固定するリング状固定部材と、

前記ケーシングの前記円筒部内に摺動自在に配設され、前記シリンダ部材から供給される圧縮流体および弾性体を介して直線的に変位する円筒状ピストン部材と、一端に前記ケーシングの外部に露呈してワーク押圧用クランプアーム部材を設け、前記ピストン部材内に配設されるロッド部材と、

前記ピストン部材と前記ロッド部材との間に構成され、該ロッド部材を該ピストン部材に対して回動させる回動手段と、

を備えることを特徴とするクランプ装置。

【請求項2】 請求項1記載のクランプ装置において、前記クランプアーム部材は、前記ロッド部材の一端に摺動自在に装着されており、

前記治具バレットに固定されて該クランプアーム部材のワーク押圧側の一端とは反対側の他端に係合する支柱部材を備えることを特徴とするクランプ装置。

【請求項3】 請求項2記載のクランプ装置において、前記支柱部材は、前記リング状固定部材を前記治具バレットに固定するための締結手段を構成することを特徴とするクランプ装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、ワークに対して進退および旋回自在なクランプアーム部材で前記ワークを押圧保持するためのクランプ装置に関する。

【0002】

【従来の技術】 一般的に、トランスファマシンは、ワークの加工に必要とされる種々の異なる加工装置や、前記ワークをその加工部位に対応して所望の姿勢に変換させるワーク変換装置等を所定間隔離間して配設し、移送装置を介して前記ワークをそれぞれのステーションに、順次、搬送して所望の加工を行うように構成されている。

【0003】 この場合、それぞれのステーションにおいて、ワークに正確に所定の加工作業等を施すために、前記移送装置で搬送されるワークを、例えば、治具バレット上に強固に位置決め固定する必要がある。そこで、治具バレットにワークを保持するため、従来から種々のクランプ装置が使用されている。

【0004】 この種のクランプ装置は、通常、円筒状の

ケーシングを備え、このケーシング内に形成された室にピストンが摺動自在に配設されている。このピストンから上方向に延在するピストンロッドの先端部に、クランプ用アーム部材に係着されており、このアーム部材を介してワークを治具バレット上に押圧固定している。

【0005】 その際、ピストンロッドの外周面には、軸線方向から外周方向に指向して傾斜するリード溝が形成される一方、ケーシングの内周面部に溝部が形成されており、この溝部と前記リード溝とに球体が一体的に嵌合している。そして、ケーシング内の室に圧縮流体が導入されると、リード溝と溝部とに一体的に嵌合する球体の案内作用下に、ピストンが所定方向に回動しながら上昇し、ワークを押圧保持しているアーム部材は、このワークの上方からさらに所定角度だけ離間した位置に待避することができる。

【0006】

【発明が解決しようとする課題】 ところで、上記のクランプ装置では、ケーシング部材が、治具バレット上に直接ボルトにより締結されている。このため、ワークの形状が変更されるのに伴ってクランプ位置が変更される際、容易に対応することができないという欠点がある。このため、通常、治具バレット上に予め多数のねじ穴を設けておき、クランプ位置の変更に伴ってケーシング部材を所定の方向に回動させた後、所定のねじ穴にボルトを締結する作業が行われている。

【0007】 これにより、ワークの形状が変更される際の段取り替え（準備作業）が相当に煩雑なものとなり、特に、多数のクランプ装置を備える際には、該準備作業に多くの時間を要するという問題が指摘されている。

【0008】 本発明は、この種の問題を解決するものであり、簡単な構成で、ワークの形状変更に伴う準備作業を容易かつ短時間で遂行することが可能なクランプ装置を提供することを目的とする。

【0009】

【課題を解決するための手段】 前記の課題を解決するために、本発明は、治具バレットに圧縮流体供給源に連通する有底円筒状シリンダ部材を位置決め固定しておき、クランプアーム部材を設けたロッド部材と、このロッド部材が配設される円筒状ピストン部材と、このピストン部材が配設されるケーシングとが、前記シリンダ部材に一体的に回動自在に挿入される。そして、シリンダ部材の固定側フランジ部上にケーシングに設けられた可動側フランジ部が載置され、リング状固定部材で前記可動側フランジ部の上面を押圧支持することにより、前記ケーシングが治具バレットに対して固定される。

【0010】 次いで、ワークの形状変更等に伴ってクランプアーム部材によるクランプ位置を変更する際には、リング状固定部材を緩めて可動側フランジ部への押圧作用を解除した後、ケーシングを所定の角度だけ回動させ

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ると、このケーシングと一体的にピストン部材およびロッド部材を介してクランプアーム部材が回転する。そこで、クランプアーム部材が所定の角度位置に配置された状態で、リング状固定部材を治具バレットに締結する。

【0011】これにより、リング状固定部材を緩めた後、ケーシングを回転させるという極めて簡単な操作で、ワークの形状の変更に容易かつ迅速に対応することができる。

【0012】また、クランプアーム部材がロッド部材の一端に揺動自在に装着されており、このクランプアーム部材のワーク押圧側と反対側の端部に支柱部材に係合する。このため、クランプアーム部材は、支柱部材を支点にしてワークを押圧する、いわゆる両持ちクランプ機能を有する。その際、支柱部材がリング状固定部材を治具バレットに固定する締結手段を構成すれば、装置全体の小型化および部品数の削減が容易に遂行される。

【0013】

【発明の実施の形態】図1は、本発明の第1の実施形態に係るクランプ装置10が治具バレット12に組み込まれた状態の縦断面図であり、図2は、前記クランプ装置10の分解斜視図である。

【0014】治具バレット12は、ワークWを位置決め保持した状態で、図示しない移送装置を介してトランスファ内の各ステーションに前記ワークWを順次搬送する。治具バレット12は、所定の部位に鉛直方向に比較的大径な孔部14を所定の深さまで形成しており、この孔部14の下部側には、切り欠き部16が連通する。治具バレット12の上面には、孔部14の外周端一部に連通して所定の深さまで断面半円状の穴部18が形成されるとともに、この孔部14に同軸な円周上には、所定角度間隔離間して複数のねじ穴20が形成される。

【0015】図1および図2に示すように、クランプ装置10は、治具バレット12の孔部14に挿入される有底円筒状シリンダ部材22を備える。シリンダ部材22の底部24の内面中央側に凹部26が形成され、この凹部26は、前記底部24の外周側から中心に向かって形成された通路28に連通する。通路28は、図示しない圧縮流体供給源に連通自在である。

【0016】底部24から上方に延出される筒状部30の上端部には、半径外方向に突出して固定側フランジ部32が設けられ、この固定側フランジ部32の一部に、治具バレット12の穴部18に対応する断面半円状の穴部34が形成される。穴部34と治具バレット12の穴部18とは、ロックピン36が一体的に圧入され、シリンダ部材22が前記治具バレット12に位置決め固定される。

【0017】シリンダ部材22には、ケーシング38がリング状固定部材40を介して固定される。ケーシング38は、円錐状の上面部を有してその外周一端縁部にストッパピン42が植設される。ケーシング38は、シリ

ンダ部材22の筒状部30内に回転自在に挿入される円筒部44を有するとともに、この円筒部44の上部側には、半径外方向に突出して前記シリンダ部材22の固定側フランジ部32上に当接する可動側フランジ部46が設けられる。ケーシング38の上面部中央には孔部48が形成され、この孔部48は、段部を介して孔部50および比較的大径な孔部52に連通する。円筒部44の外周一端部には孔部52に連通するねじ穴54が形成され、このねじ穴54にセットビス56が螺合される。

10 【0018】固定部材40は、リング状を有しており、その上部側に半径内方向に突出してリング状の押圧部58が設けられる。固定部材40には、その軸線方向に平行して所定の位置に複数のボルト挿通孔部60が形成される。各孔部60にボルト62が挿通されて、それぞれの先端部が治具バレット12のねじ穴20に螺合されることにより、固定部材40の押圧部58で可動側フランジ部46が固定側フランジ部32に押圧されて、ケーシング38が前記治具バレット12に固定される。

20 【0019】ケーシング38の孔部52には、ピストン部材64が摺動可能に嵌合されるとともに、このピストン部材64にロッド部材66が回転手段68を介して回転自在に配設される。

【0020】ピストン部材64は、略円筒状を有しており、その閉塞した一端に平板部70が形成される。ピストン部材64の内周面部には、断面半円状を有して螺旋状に周回する溝部72が形成されるとともに、この溝部72の一部にリターン用逃げ部74が形成される。ピストン部材64の外周部には、軸線方向に所定の長さを有した切り欠き部76が形成され、この切り欠き部76にセットビス56が挿入される。

30 【0021】ロッド部材66は、ケーシング38の孔部48に嵌合する第1棒体部78を有し、この第1棒体部78の端部に第1肩部80を介してより大径な第2棒体部82が形成される。この第2棒体部82の端部には、第2肩部84を介して一層大径な第3棒体部86が設けられるとともに、この第3棒体部86に断面半円状を有して螺旋状に周回する溝部88が形成される。溝部88の両端同士は、リターン溝90を介して連結され、エンドレス状のボール通路が形成される。この溝部88とピストン部材64の溝部72とに複数のボール92が一体的に嵌合し、これにより回転手段68としてのボールねじ手段が構成される。

50 【0022】ロッド部材66の第1棒体部78の中央部には、その軸線方向にねじ穴94が所定の深さだけ形成されており、第3棒体部86の中央部には、孔部96が形成される。孔部96には、板状のばね部材98が介装され、このばね部材98の端部に係止用リング100が当接するとともに、この係止用リング100に球体102に係合する。球体102の直径は、係止用リング100の内径より大きく選択されており、ピストン部材64

にロッド部材66が装着された状態で、前記球体102の端部が平板部70に当接して前記ロッド部材66の第3棒体部86の端面と該平板部70の内面との間に所定の隙間が画成される。

【0023】ケーシング38の孔部52内に板状のばね部材104が介装され、このばね部材104の弾発力を介してピストン部材64およびロッド部材66が前記孔部52の外方（鉛直下方向）へと押圧される。このばね部材104は、ばね部材98より相当に大きな弾発力を有している。

【0024】第1棒体部78と第2棒体部82との境界段部に、耐摩耗性材料で形成されたリング106が配設される。第1棒体部78は、ケーシング38の孔部48に嵌合してその先端部を外部に露呈しており、この先端部にワーク押圧用クランプアーム部材108が装着される。クランプアーム部材108は、その一端部側に台形状を有する押圧部110を有し、この押圧部110に対応する他端部側にボルト挿通用孔部112とこの孔部112より大径な棒体嵌合用孔部114とが形成される。

【0025】クランプアーム部材108の孔部114にロッド部材66の第1棒体部78が嵌合し、ボルト116が前記クランプアーム部材108の孔部112から前記ロッド部材66のねじ穴94に螺合することにより、該クランプアーム部材108が前記ロッド部材66に固定される。

【0026】ケーシング38の円筒部44とシリンダ部材22の筒状部30とを液密にシールするためのシール部材118a、118bが配設されるとともに、前記ケーシング38の孔部48には、ロッド部材66の第1棒体部78と前記ケーシング38との隙間から孔部52に塵埃等が進入することを阻止するためのシール部材118cが配設される。

【0027】このように構成されるクランプ装置10の動作について、以下に説明する。

【0028】図1および図3に示すように、ロッド部材66に係着されているクランプアーム部材108を介してワークWの凸部Waが押圧保持された状態で、治具バレット12が移動されてこのワークWに所定の加工作業等が施される。次に、加工済のワークWを新たなワークWと交換するために、治具バレット12が所定の圧縮流体供給位置に移動される。

【0029】そこで、図1に示すように、シリンダ部材22の通路28に圧縮空気供給用管路（図示せず）が接続され、この通路28に圧縮流体が供給されると、この圧縮流体が凹部26に供給された後、ピストン部材64を鉛直上方向に押圧する。このため、ピストン部材64は、ケーシング38のねじ穴54に螺合しているセットビス56とこのセットビス56が挿入される切り欠き部76との案内作用下に、ばね部材104の弾発力に抗して鉛直上方向に直線的に変位し、このピストン部材64

内に配設されているロッド部材66も同様に上昇する。従って、ロッド部材66の上端部に係着されているクランプアーム部材108は、その押圧部110をワークWの凸部Waから離間して前記ワークWの保持作用を解除する。

【0030】図4に示すように、ピストン部材64がさらに上昇すると、ロッド部材66の第1棒体部78と第2棒体部82との境界部位に配設されているリング106がケーシング38の孔部48、50との間の段部に当接する。この状態で、圧縮流体の作用下にピストン部材64が鉛直上方向に押圧されると、このピストン部材64は、切り欠き部76に挿入されているセットビス56により回転することがなく、ボールねじ手段である回転手段68を介してロッド部材66が所定方向に回転する。

【0031】その際、ロッド部材66は、第3棒体部86の端面がピストン部材64の平板部70に当接するまで回転することになる。この結果、ロッド部材66の先端部に係着されているクランプアーム部材108は、ワークWの凸部Waの上方から所定方向に回転して待避し、このクランプアーム部材108の押圧部110が前記ワークWから効果的に離間する（図4参照）。

【0032】次に、治具バレット12からワークWを取り外し、新たなワークWをこの治具バレット12上に載置してクランプ装置10で位置決め固定する。

【0033】すなわち、通路28への圧縮流体が供給を停止されると、ピストン部材64に鉛直上方向に作用していた押圧力が解除され、このピストン部材64には、ばね部材104の弾発力だけが作用する。このため、ピストン部材64が鉛直下方向に変位し、このピストン部材64の平板部70に押圧されていたロッド部材66は、前記ピストン部材64が下降することにより、ばね部材98の弾発力を介して前記とは逆方向に回転する。そして、第2棒体部82と第3棒体部86との境界段部である第2肩部84がピストン部材64の上面部と一致する際に、前記第2肩部84にばね部材104が当接してロッド部材66の回転が停止する。

【0034】さらに、ロッド部材66とピストン部材64とが一体的に下降し、このピストン部材64の平板部70がシリンダ部材22の底部24の内面に当接する直前で、クランプアーム部材108が新たなワークWの凸部Waに係合する。これにより、新たなワークWは、ピストン部材64とロッド部材66とに作用するばね部材104の弾発作用下に、クランプアーム部材108を介して治具バレット12上に対し強固に位置決め保持される。

【0035】ところで、新たなワークWの形状が変更されることによって、この新たなワークWのクランプ位置である凸部Waの位置が変更される際、クランプ装置10では、準備作業としてクランプアーム部材108の位

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置調整が行われる。

【0036】すなわち、先ず、固定部材40を治具バレット12に固定しているボルト62が緩められ、この固定部材40の押圧部58による可動側フランジ部46への押圧作用が解除された状態で、ケーシング38がピストン部材64およびロッド部材66と一体的に所定の方向に回動される。そして、クランプアーム部材108が新たなワークWに対応して位置決めされた後、ボルト62が締め付けられる。従って、固定部材40の押圧部58がケーシング38の可動側フランジ部46をシリンダ部材22の固定側フランジ部32に対し押圧保持し、前記ケーシング38が治具バレット12に固定される。

【0037】このように、第1の実施形態では、クランプアーム部材108の位置決め調整を行う際に、ボルト62を緩めてケーシング38を回動させた後、前記ボルト62を締め付ける動作を行うだけでよい。このため、例えば、治具バレット12に複数のボルト穴を設けておき、ケーシング38自体を治具バレット12に固定しているボルトを取り出して該ケーシング38を位置決めした後、再度ボルトの締め付けを行うものに比べ、新たなワークWに対応する段取り替え（準備作業）が一挙に簡素化かつ迅速化されるという効果が得られる。

【0038】特に、単一のワークWに対して多数のクランプ装置10を用いる際に、前記全てのクランプ装置10の準備作業を短時間で効率的に遂行することができる。これによって、該ワークWに対する加工作業等を含むライン全体の効率化が容易に遂行されるという利点がある。

【0039】しかも、クランプ装置10は、構成が簡素化されるとともに、小型化が可能となり、前記クランプ装置10を所望の位置に有効に配置することができる。従って、極めて汎用性に優れるという効果がある。

【0040】次に、本発明の第2の実施形態に係るクランプ装置120について説明する。なお、第1の実施形態に係るクランプ装置10と同一の構成要素には同一の参照符号を付して、その詳細な説明は省略する。

【0041】図5および図6に示すように、クランプ装置120は、ロッド部材66の第1棒体部78に支点ピン122を介して揺動自在に装着されるクランプアーム部材124を備える。このクランプアーム部材124は、ワーク押圧側の一端126とこの一端126とは反対側の他端128とを、図中、左右方向に延在して設けており、前記他端128側の底部には、溝部130を設けることによりストッパ面132が形成されている。

【0042】第1棒体部78の上部には、アーム押さえ用板ばね134が保持されている。この板ばね134は、クランプアーム部材124の他端128側に当接してこのクランプアーム部材124を、その一端126側が上方に傾斜する方向に常時付勢する。一方、板ばね134の反対側には、ストッパ136が設けられている。

【0043】治具バレット12には、固定部材40の外方に位置して孔部14と同心上の円弧面に沿って複数のねじ穴138が形成されており、一のねじ穴138に支柱部材140の端部に設けられたねじ部142が螺合する。支柱部材140は、ロッド部材66と平行して鉛直上方向に延在しており、その上端面には、クランプアーム部材124の溝部130に進入する係止棒体部144が設けられている。

【0044】このように構成されるクランプ装置120では、図5に示すクランプ状態からクランプアーム部材124を解除するために、シリンダ部材22に圧縮流体が供給されると、このシリンダ部材22内のピストン部材64およびロッド部材66が一体的に上昇する。

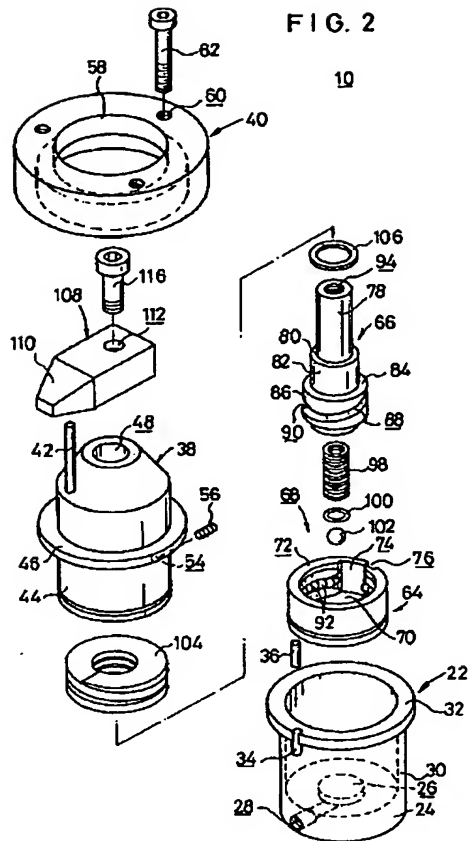
【0045】その際、クランプアーム部材124に係合する板ばね134の弾発作用下に、このクランプアーム部材124がワークWを押圧している一端126をストッパ136で停止される位置まで上方に傾動させ、前記ワークWから即座に離脱する。次いで、ロッド部材66が所定方向に回動することにより、クランプアーム部材124がワークWの上方から所定の方向に回動する。

【0046】一方、ワークWをクランプする際には、シリンダ部材22への圧縮流体の供給が停止されることにより、第1の実施形態と同様にロッド部材66が旋回動作しながら下降する。このため、ロッド部材66の第1棒体部78に装着されているクランプアーム部材124は、ワークWの上方に至った後に下降し、他端128が係止棒体部144に係止された状態で、この係止棒体部144を支点にして一端126をワークWに当接させる。従って、クランプアーム部材124は、一端126をワークWに当接し、かつ他端128を支柱部材140で支持された状態で、その略中央部がロッド部材66により下方向に引張られるため、前記ワークWを一層強固に押圧保持することができるという効果が得られる。

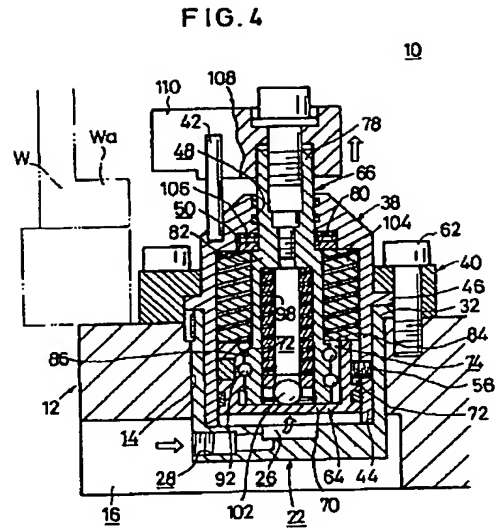
【0047】そこで、クランプ装置120において、形状の異なるワークWに対応して位置決めを行う際には、支柱部材140のねじ部142をねじ穴138から離脱させた後、第1の実施形態と同様にボルト62を緩めて固定部材40によるケーシング38の可動側フランジ部46への押圧力を解除する。次いで、ケーシング38を所定方向に回動させてクランプアーム部材124の位置決めを行う。さらに、ボルト62を介して固定部材40を締結するとともに、支柱部材140のねじ部142を所定のねじ穴138に螺合する。これにより、新たなワークWに対応するクランプ装置120の準備作業が有効に簡素化される等、第1の実施形態と同様の効果が得られる。

【0048】次に、本発明の第3の実施形態に係るクランプ装置150について、以下に説明する。なお、第1および第2の実施形態と同一の構成要素には同一の参照符号を付して、その詳細な説明は省略する。

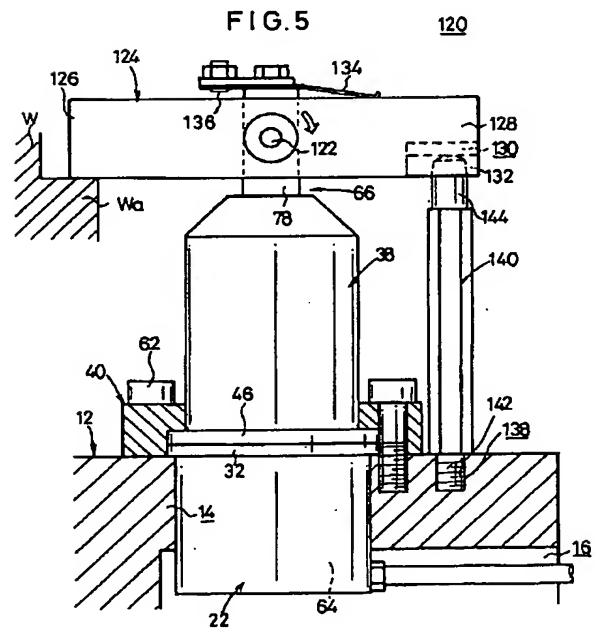
【図2】



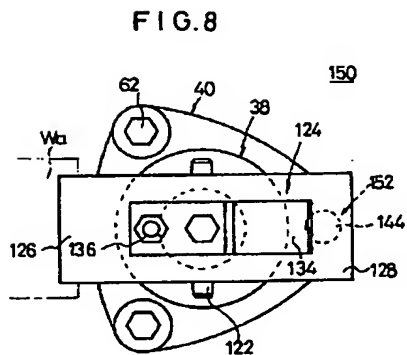
【図4】



【図5】

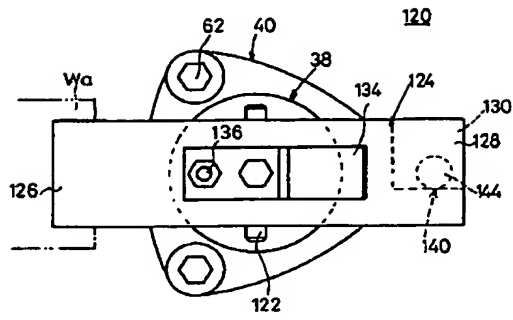


【図8】



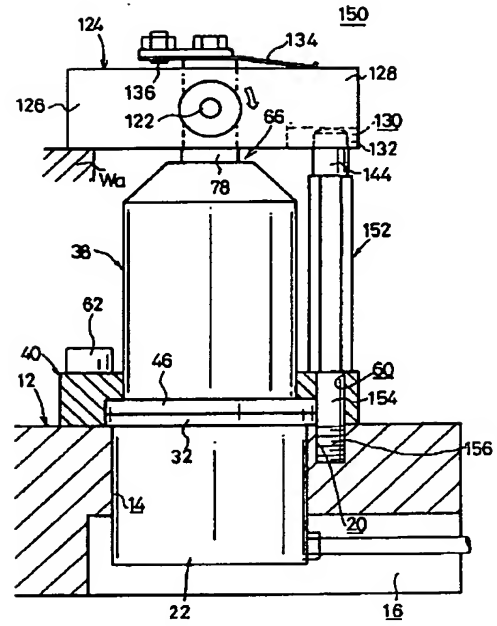
【図6】

FIG. 6



【図7】

FIG. 7



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